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The Business Benefits of Cloud Computing

West Virginia Information Technology Conference 2009

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Agenda

- What is Cloud Computing
- The Benefits of Cloud Computing
- What's in a Cloud Computing Environment
- Sample Case Study
- Key Barriers to Adoption

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What is Cloud Computing?

Cloud computing is an approach that enables organizations to leverage scalable, elastic and secure resources as services with the expected results of simplified operations, significant savings in cost, and nearly instant provisioning.

The key attributes "usually" associated with Cloud Computing

1. **Multi-tenant** – the ability to process the needs of multiple users with shared resources in a dynamic and transparent fashion
2. **Elastic and Scalable** – resources can expand and contract as needed
3. **Metered/Rented** – some manner of "pay for only what you use"
4. **Self-Provisioned** – "self check-in" at least to some degree
5. **Internet based** – accessible using internet technology, usually over the public Internet
6. **X as a Service** – the details/concerns of implementation are abstracted for the customer

The seventh attribute sets Secure cloud computing apart

7. **Secure** – an overall decrease in risk due to greater security protocols and tools from the cloud provider for data in motion, data at rest and data in process.

What Services are Typically Delivered?

Accessing the cloud is about renting *X* as a Service (XaaS)

SaaS Software as a Service
Renting execution of software solutions over the Internet (e.g., salesforce.com)

PaaS Platform as a Service
Renting use of an application environment over the Internet (e.g., Google App Engine)

IaaS Infrastructure as a Service
Renting use of computing power or storage over the Internet (e.g., Amazon's EC2 & S3)

Each successive service delivers a greater portion of the overall solution as part of the "rented" bundle.

Emergence of the Private Cloud

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The term "Cloud computing" has come to mean two different things:

Public Cloud

Focus is on the word "cloud," emphasizing access to rented resources available as services that are strictly outside the enterprise, across the public internet.

Private (Enterprise) Cloud

Focus is on the technologies that bring external cloud attributes into the enterprise: increased elasticity, agility cost-effectiveness, and service-based delivery; addresses cost and security concerns with continued use of current, private infrastructure.

Outsourced Cloud Services
External Cloud, rented services

Unisys facilitates the journey
← internal cloud ← RTI ← virtualization ← traditional data center

Private cloud computing delivers self-provisioned and automated IT capabilities as services to internal users on an immediate and as-needed basis**.**

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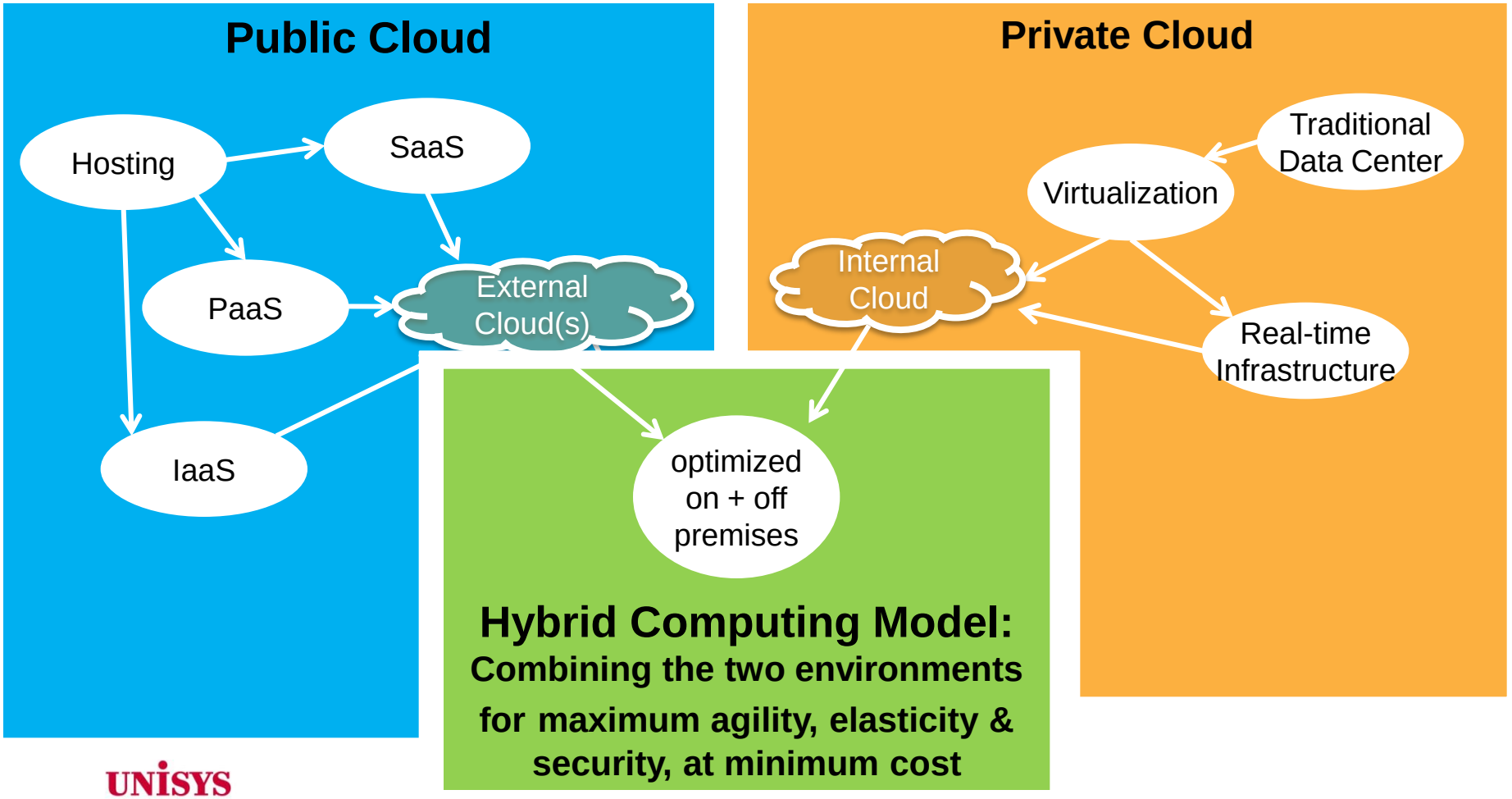
Hybrid Cloud Models Provide Enterprise Flexibility

Hybrid cloud integration allows Enterprise Data Centers to selectively utilize SAAS offerings and Load Balanced PAAS / IAAS operating models where appropriate



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But Why the Sudden Interest?

Gartner's 10 Strategic Technologies for 2009

1. **Virtualization** *(Ranked No. 5 last year)*
2. **Cloud computing** ***(New to the list)***
3. **Computing fabrics** *(No. 8 last year)*
4. **Web-oriented architecture** *(New but similar to "the Web platform" No. 7 last year)*
5. **Enterprise mashups** *(No. 6 last year)*
6. **Specialized systems** *(New to the list)*
7. **Social software and social networking** *(No. 10 last year)*
8. **Unified communications**
9. **Business intelligence** *(New)*
10. **Green IT** *(No. 1 last year)*

Cloud Computing is generating significant interest due to the confluence of **emerging Cloudware technology** and the **drive to minimize additional capital expenditures** on data centers and infrastructure

Gartner Identifies the Top 10 Strategic Technologies for 2009: http://www.gartner.com/it/page.jsp?id=777212
Gartner Identifies the Top 10 Strategic Technologies for 2008: http://www.gartner.com/it/page.jsp?id=530109

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A Growing Applications Portfolio is Increasing IT Complexity & Cost!

Applications Growth

- The sheer number of applications supported by the IT function is growing over 7% on average annually

Infrastructure Costs

- Overall IT budgets are not increasing
- Infrastructure support costs are growing at a similar rate, and consuming a greater % of the typical IT budget

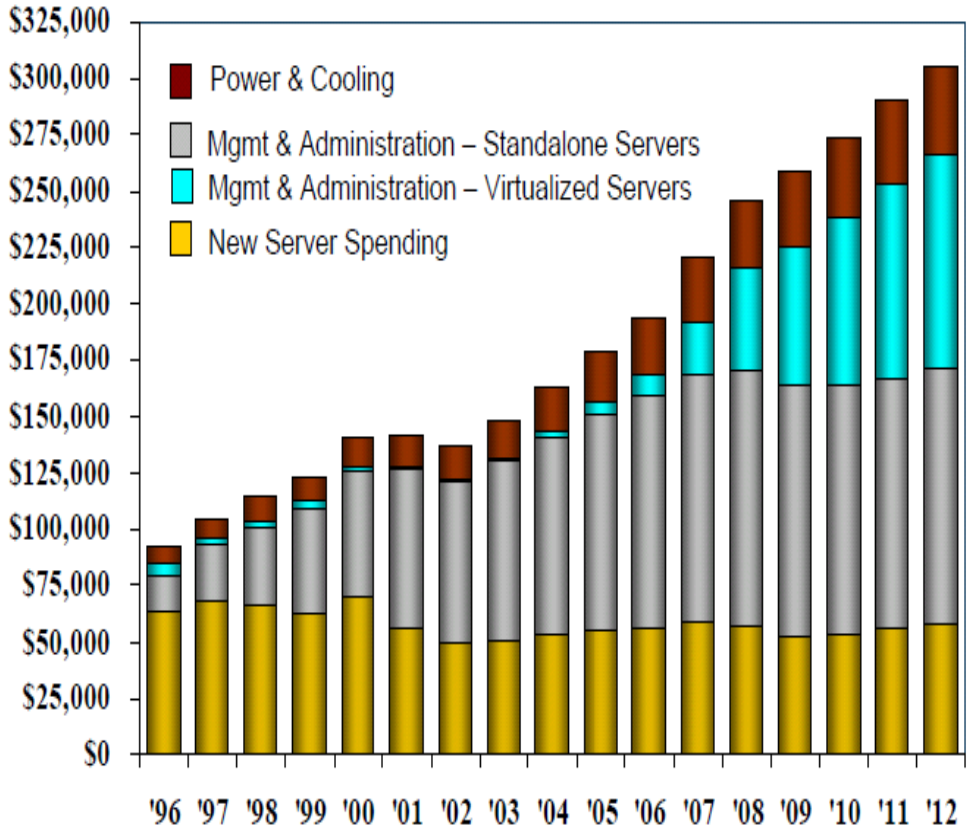
Emerging "Cloud" Technology Advances

Help reduce overall infrastructure costs by

- **Offloading Non-Critical Applications to Internet Providers**
- **Reduce Cost by increasing Utilization & Automation in the Data Center**
- **Consolidating redundant applications by providing them "As a Service"**

Benefits of a Cloud Environment

Worldwide IT spending – server related



Source: March 2009 IDC Directions

Reduced Operating costs

- Reduce Equipment Expenses by driving virtualization to 70-80% through improved VM Management
- Reduce Labor and Administration cost by increasing server administration ratios from 20-35:1 to over 400:1 in a cloud farm environment
- Standardize and Automate ITIL tasks to reduce labor expense and drive self service

Improved Service Levels

- Reduce Provisioning Time & Cost from hours /days to minutes.
- Improve Performance using dynamic re-provisioning and Converged monitoring to repurpose capacity.

Reduce Capital Expenditures

- Significantly reduce need to add new equipment (servers, storage, and network)
- Reposition costs from capital expense to operating expense

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Key Business Outcomes for Public Cloud

1. **Shift non-mission Critical workloads out of expensive Data Center Environments**
   Offload non-mission critical applications out of the data center onto a low cost public cloud, and allow the data center to focus on core applications.

2. **Increase Application Standardization through SAAS deployment**
   Lower Application support costs by standardize key applications (such as e-mail, collaboration, office suites, CRM) through standardized SAAS offerings

3. **Transition Costs from Capital Expense to Operating Expense**
   New Provisioning in the cloud is managed can be paid for as an operating expense, eliminating expensive up-front capital costs.

4. **Offload Capacity Spikes onto pay as you need it Infrastructure**
   Allow Cloudbursting technology to load balance capacity spikes onto pay-as-you-go cloud services, reducing *infrastructure over-provisioning*

Key Business Outcomes for Private Cloud

1. **Lower Costs through Increased Virtualization and Automation**

   Advanced CloudWare allows for effective, automated management of highly virtualized Cloud Farms, providing for greater utilization, lower management overhead and significantly lower infrastructure costs (*70-80% virtualization*)

2. **Efficient Self Service Model for Provisioning & De-provisioning**

   Self service provisioning lowers labor costs and provides faster, more effective service for users of data center services.

3. **Eliminate Underutilized DC Assets via Rapid Repurposing**

   Easily repurpose servers, storage, software licenses (environmental and application) across a broad array of users via advanced provisioning tools

4. **Simplify and lower costs associated with Disaster Recovery**

   Provide cheaper disaster recovery warm site implementation through use of hybrid cloud infrastructure models

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… But Issues and Concerns Remain

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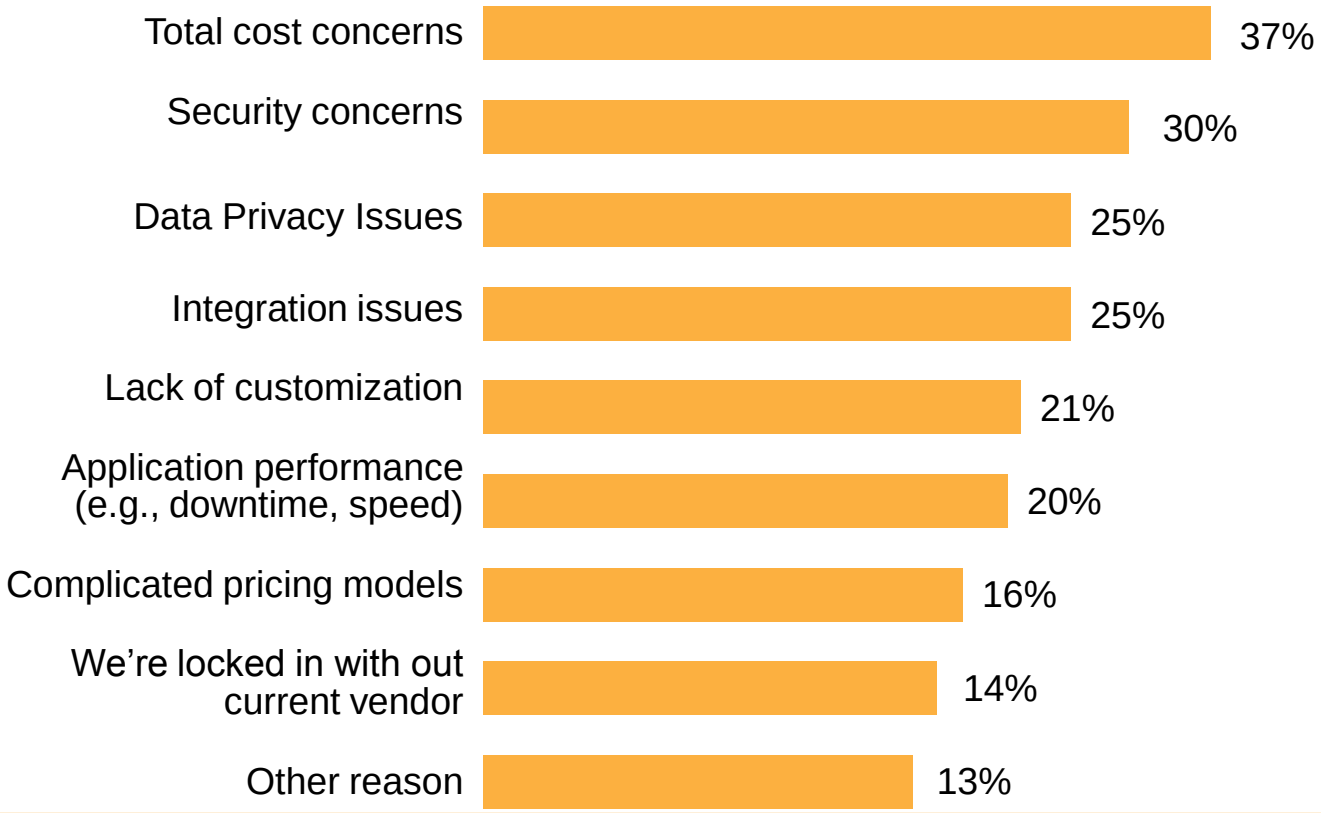
* Q4 Survey of Potential Cloud Computing buyers



Many barriers to adoption, such as security, Data Privacy, DC Integration Issues, and SLA's remain. This is especially true for mission critical data center environments

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… These issues impact the strategy on how to utilize Public or Private cloud approaches

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- **Security**
  - Concerns about hacking from unknown applications running on multi-tenanted cloud environments
  - Many Applications are not security hardened to run outside the firewall
  - Most providers do not allow enterprises to embed security and management agents and monitors
  - Will the cloud operator be responsible for system breaches?
- **Data Privacy and Regulatory Compliance**
  - Can Data be encrypted in the cloud environment?
  - Do I lose control over who has access to critical / sensitive data?
  - Does the cloud operator share responsibility for data breaches?
  - Can you ensure chain of custody for sensitive data?
  - Can you ensure compliance with key regulations (HIPAA, etc.)?
- **Business Criticality**
  - Are Stability and other RAS requirements guaranteed contractually?
  - What are the performance (SLA's), and are they sufficient?

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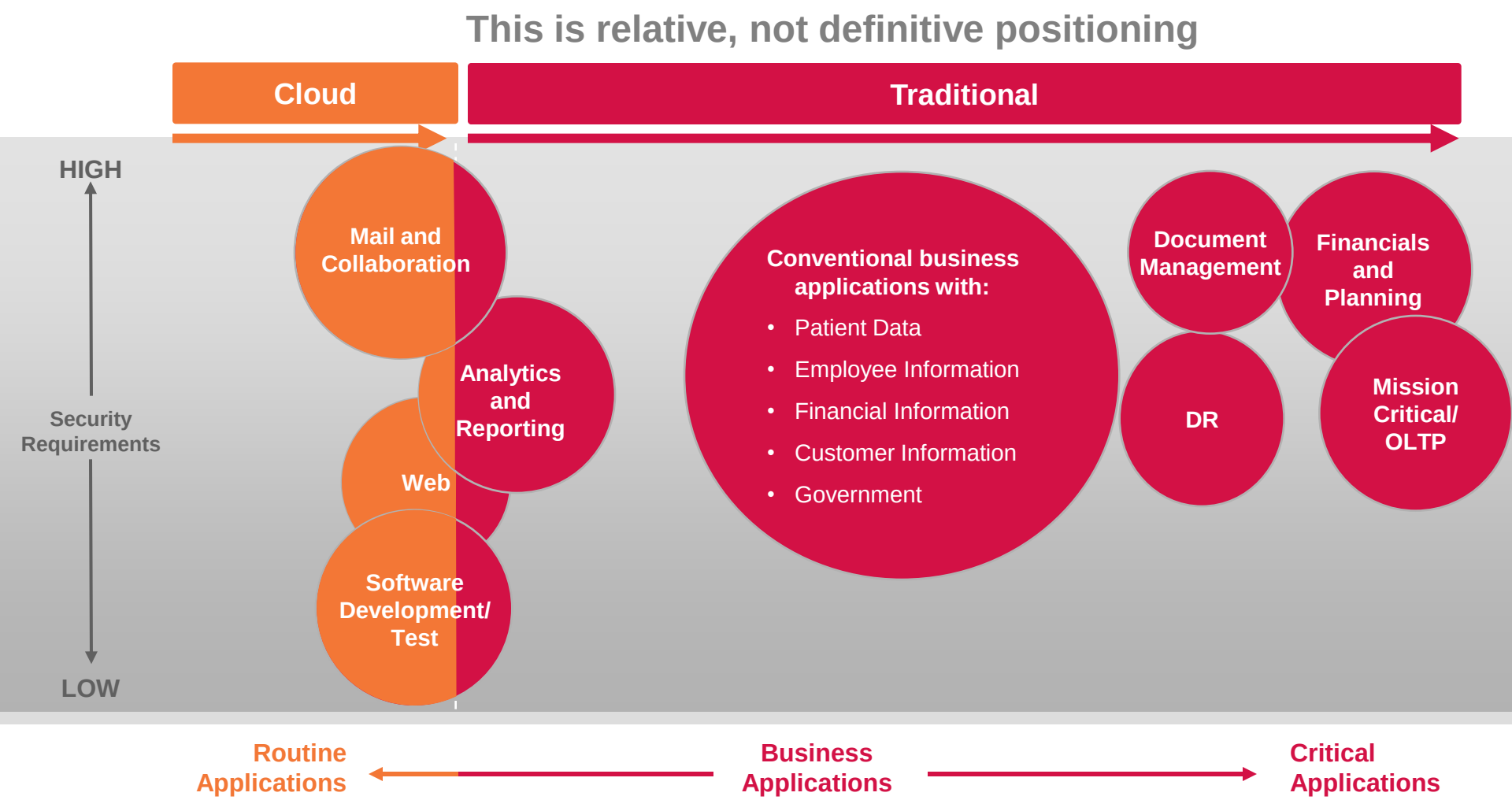
What Applications Are Moving to Cloud Environments?



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What Cloud Services are in use Today?

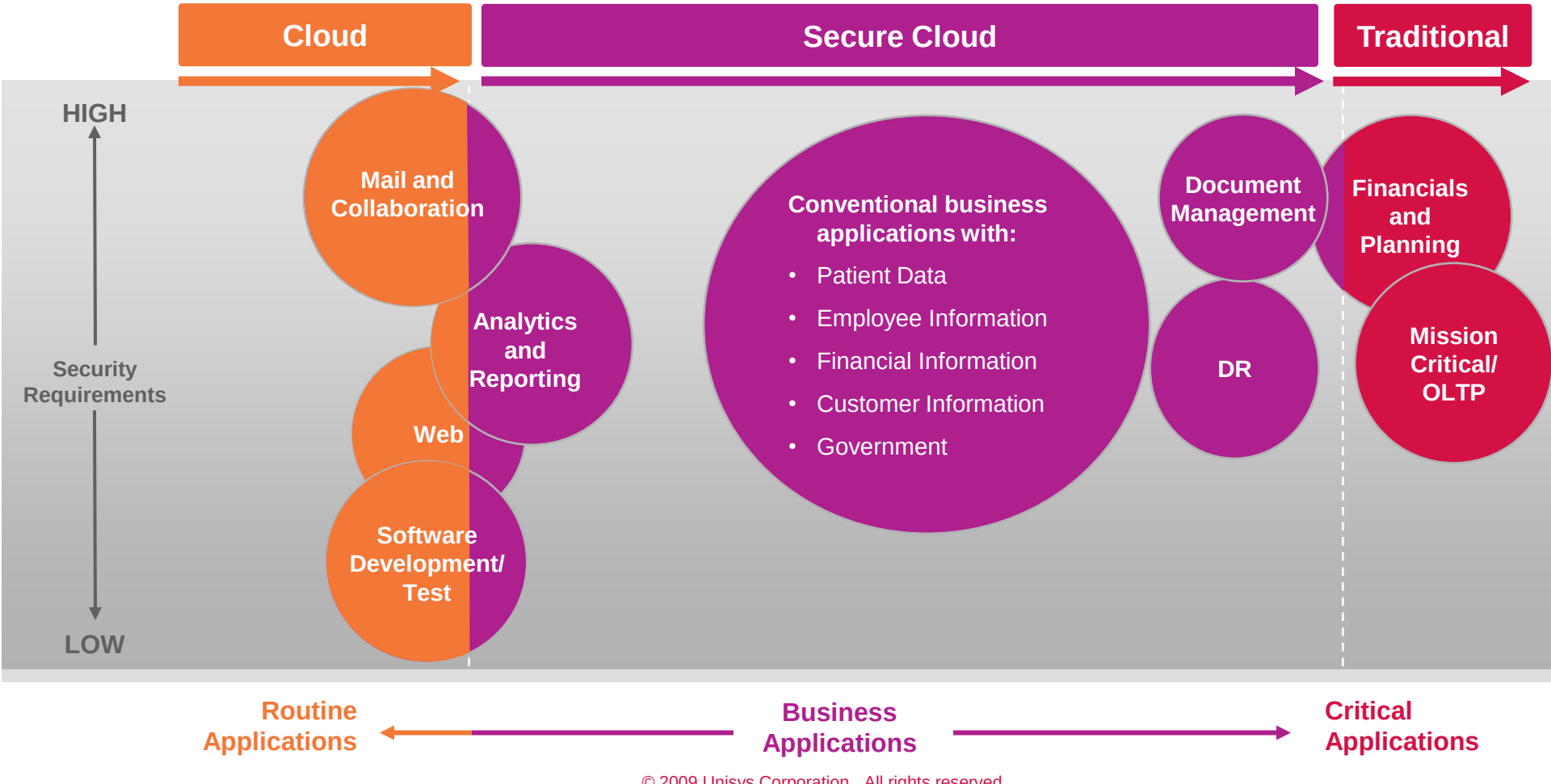
Current usage of Cloud Capabilities tend to be concentrated in five primary areas

- Non-Mission Critical Server Provisioning (IaaS, PaaS)
- Testing, Development, and R&D Environments
- Commoditized Collaboration Applications delivered via SaaS
  (such as e-mail, meeting and communication services)
- Enterprise Private Cloud Implementations
- Disaster Recovery Environments

Many of the early Public Cloud environments (Google, Amazon) have focused exclusively on individuals and SMB users, with low cost, highly restricted, low service level offerings

A Secure Cloud Opens More Options

Survey participants indicate a willingness to move many additional applications onto Cloud Farm environments, if they are proved to be Secure



What's inside a Cloud Computing Farm?

A Robust Cloud offering requires the successful implementation and integration of several key technologies in order to provide seamless, secure, scalable service

Cloud Farm	Dedicated Server and Storage farm managed by CloudWare environment
Virtualization Layer	Virtualization software that allows servers, storage, environmental software & sometimes apps to be virtually deployed
Provisioning / Governance	Automated, flexible asset provisioning, persona management, persona configuration
Service Management	Provides ITIL service management functions and automated orchestration / runbooks
Security	Provides enterprise class protection for shared users, intrusion protection, and data safety & encryption
UI / Self Service	Allows user to self specify and self provision cloud capabilities

The Cloudware Stack :
Building a Cost-effective Secure Cloud Farm

Provide self-service access to software and server provisioning and ITSM support

Secure Cloudware Stack

Security

Implement Stealth DIM* and DAR* security to provide effective isolation

Service Management

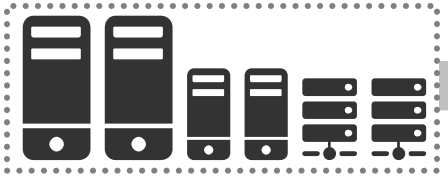
Implement robust ITIL-based service management through automation

Provisioning

Fully automate provisioning (virtual, physical), configuration and compliance management of virtual software and “personas”

Virtualization

Fully virtualize the server and storage resources to provide flexibility and scalability



A server/storage farm populated with both scale-up and scale-out servers.

****Data in Motion (DIM); Data at Rest (DAR)***

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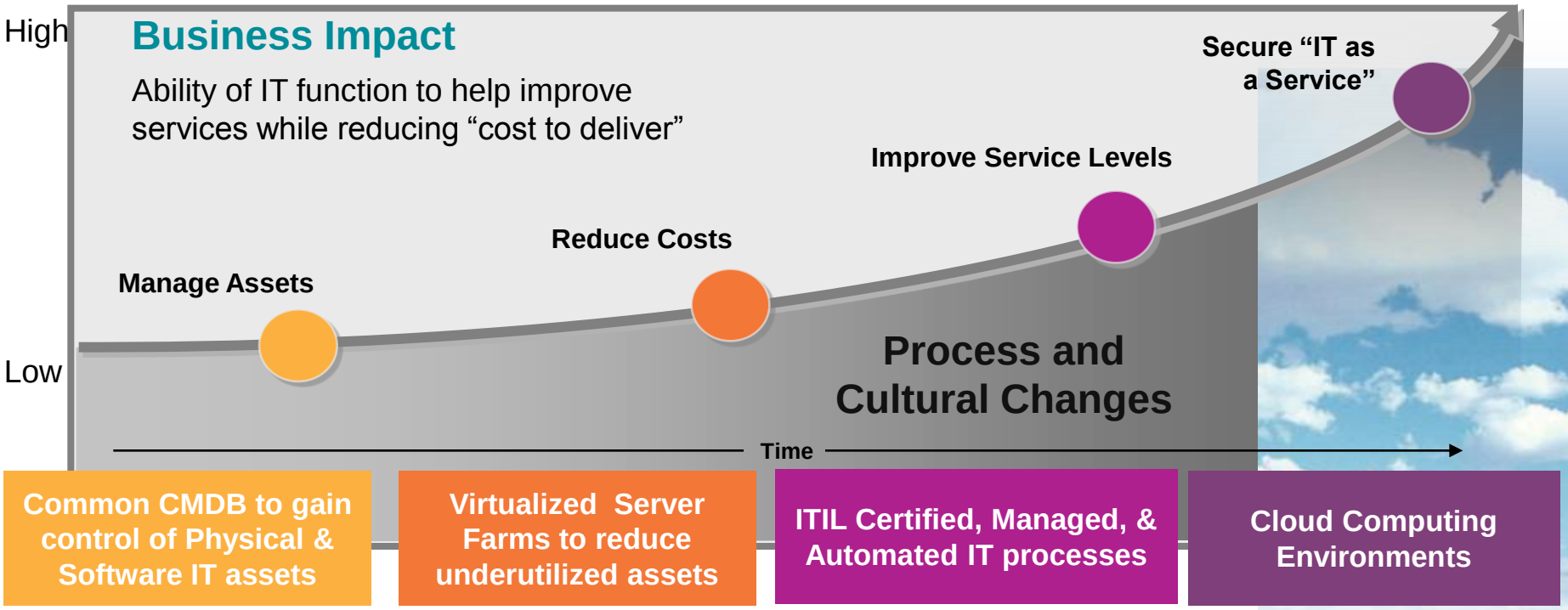
Cloud Computing is an Evolutionary Approach

From Data Center Transformation to Cloud Service Offerings



Cloud Computing is NOT a revolutionary approach to IT, but builds on existing investments in Data Center Transformation Technology

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The Cloud Market :
How do we classify the provider community?

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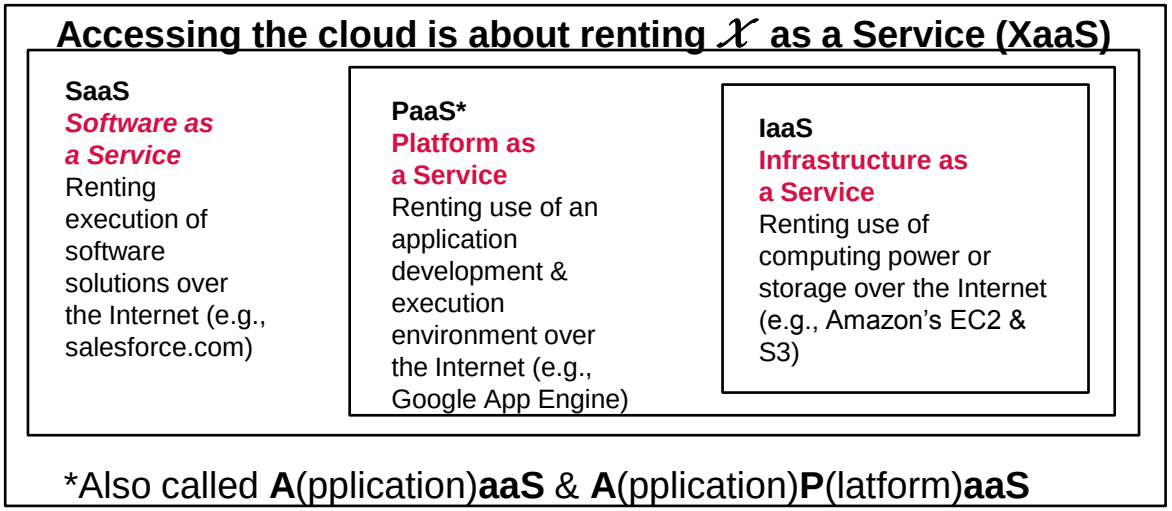

Cloud publisher
Offers SaaS Applications to clients using cloud computing technology.

Cloud integrator
create, transform and migrate apps and infrastructure into the cloud; build internal and hybrid cloud solutions

Cloud enabler
create technology, platforms, tools, standards, etc., that make possible enterprise SLAs in the cloud

Cloud provider
Provides Cloud Services by owning and operating a Public or Private Cloud Farm

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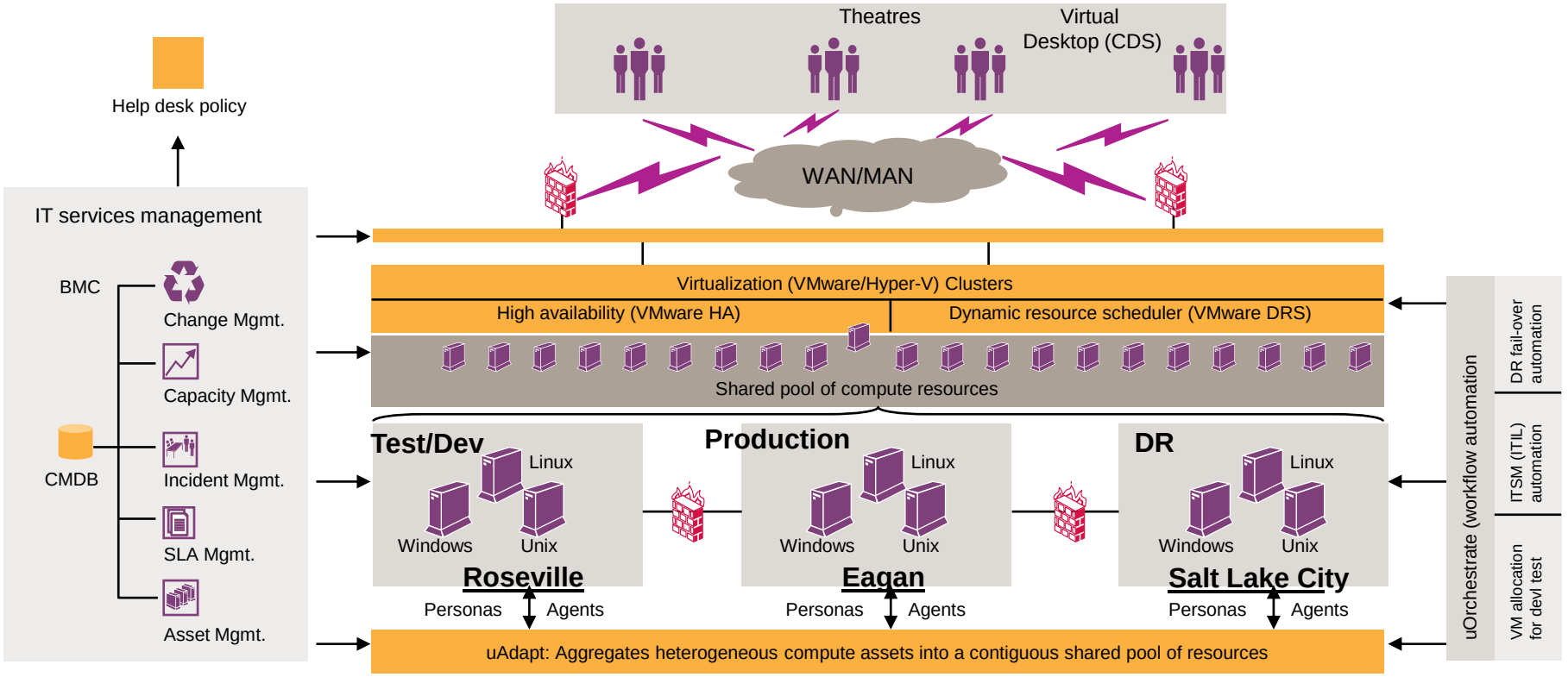
Case Study
Unisys Internal IT Cloud Initiative



"Unisys has utilized our Cloud technologies to build a virtualized cloud pool which supports dynamic provisioning of our Test / Development, and DR environments"

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Summary of Accomplishments To Date

Old Data Center	Transformed Data Center
Difficult to repurpose resources quickly for changing engineering requirements	**Dynamic Computing Infrastructure** Standardized, scalable, portable and highly available
Complex process with all requests - whether virtual machines or physical servers - manual work required	**Self-Service** Intuitive, easy to use and self provisioning of resources
All aspects of the data center were manual with little configuration management	**Minimal or Self-managed** Automation, self-scheduling resources and configuration management
Repurposing servers to new tasks was time consuming or not possible	**High Utilization** Quickly and easily repurpose an instance of a new environment in production or test
Server Virtualization stuck at 30% due to virtual server management overhead	**Highly Dynamic Utilization Capability** Server Virtualization exceeds 75% and servers easily shared across production, DR, and Test environments

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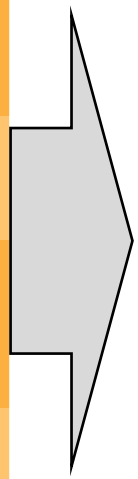
RESULTS:
Significant Savings in IT Costs

Request Type	# per Year	Before Provisioning Time	After Provisioning Time
Server Virtualization	~700	**10+ Days**	**5 minutes**
Desktop Virtualization	~200	**10+ Days**	**5 minutes**
Standard Physical Configurations	~250	**15+ Days**	**20 minutes**
Custom Physical Configurations	~200	**20+ Days**	**2-3 days**
Systems & Management Cost	900	**Servers averaging 20% Utilization**	**# Servers reduced 40%**



Overall reduction in Server Management costs of over 35%, and a 40% reduction in server procurement costs

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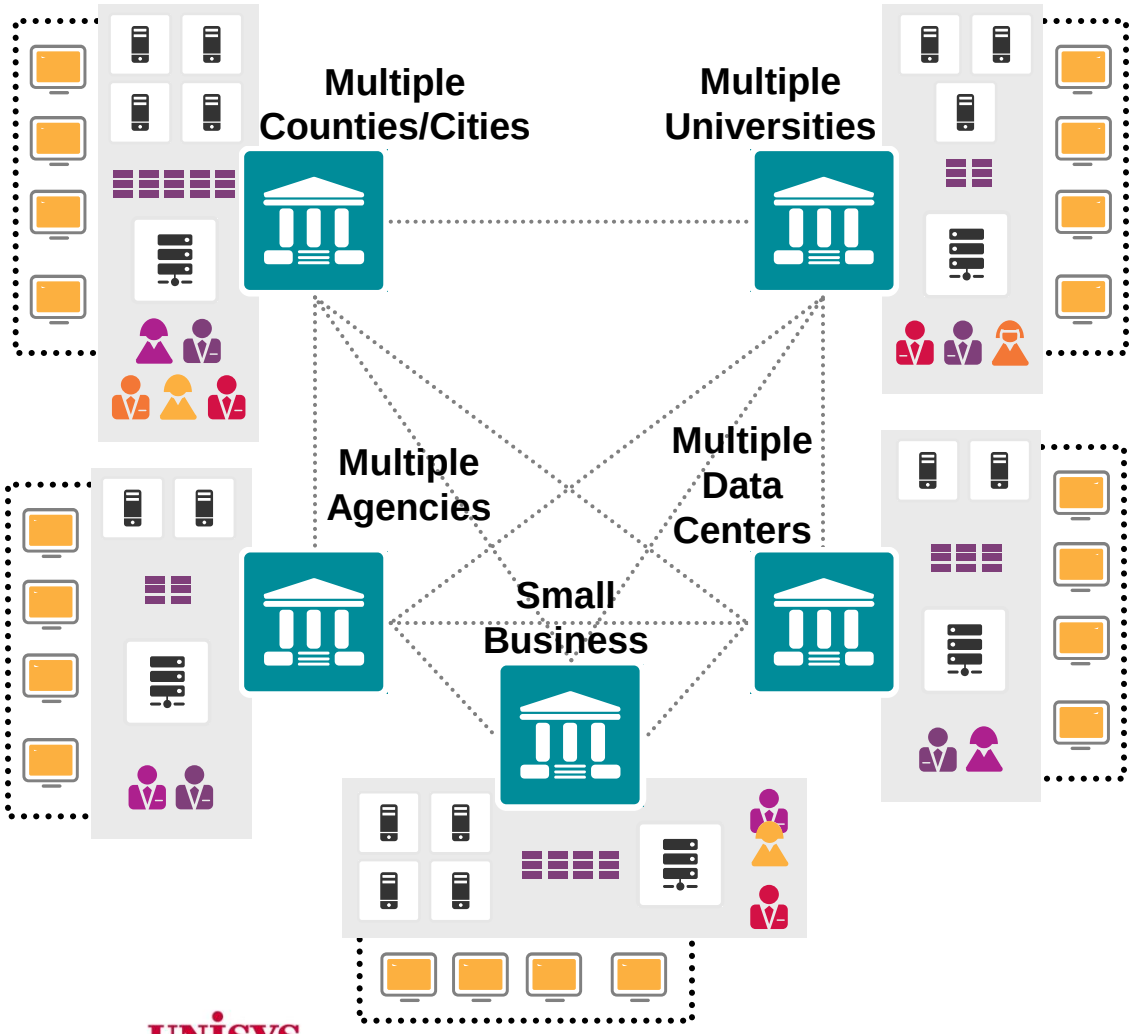
Many States are Investigating Cloud Computing Implementations



The IT Infrastructure Problem

- Under-utilized infrastructure
- Non-standard processes
- Duplicate data, systems, networks and applications
- Redundant Capital Expense and Maintenance Costs

The Desired Outcomes

- Transform IT: Get More with Less, both At-the-State/Across-the-State
- Reduce Upfront Capital Expenses
- Consolidation & Simplification
- Support Emerging Businesses through low cost shared IT Offers

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Cloud Computing in Government

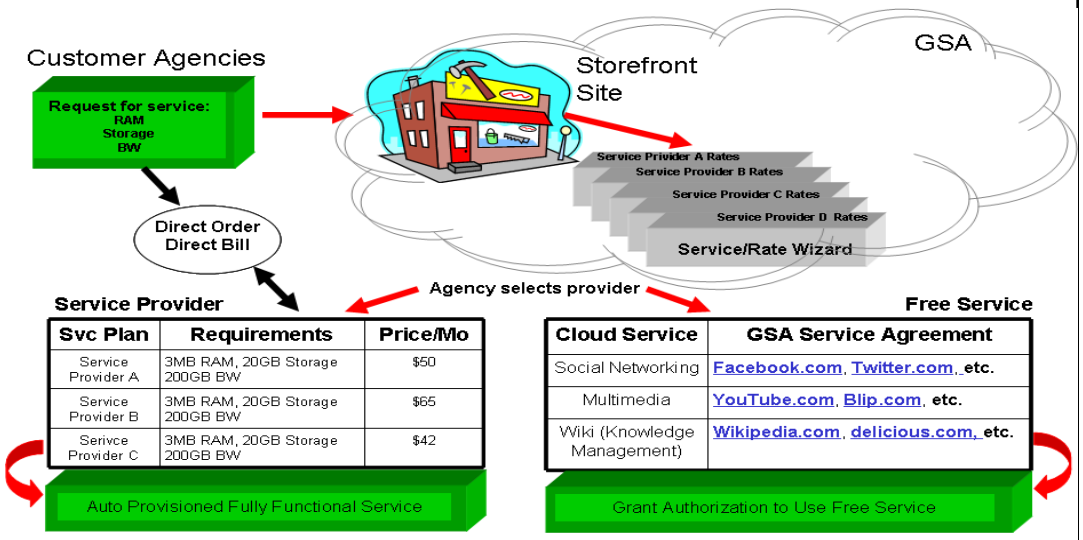
- **USA.GOV**
  - Private cloud for GSA
- **Utah**
  - Private cloud for state, counties and cities
- **Michigan**
  - Private cloud for state agencies, counties, cities and schools
- **City of Los Angeles**
  - Announcement with Google to consolidate city e-mail systems onto Cloud based Gmail

Credit: *Technology Review*

Federal Government Cloud Strategy

- **Federal CIO Vivek Kundra identified Cloud as a key pillar that will drive his technology agenda**
- **CIO Council Cloud Computing working group established with Casey Coleman, GSA CIO, as the lead**
  - **11** other Federal Agencies participating in Governance
- **GSA Identified as the lead agency/ managing partner for establishing the Federal cloud**

- Simplify the customer experience – web application "storefront" (Apps.gov)
- Front-end user interface based on simple commercial hosting model
- Provides access to service agreements negotiated by GSA

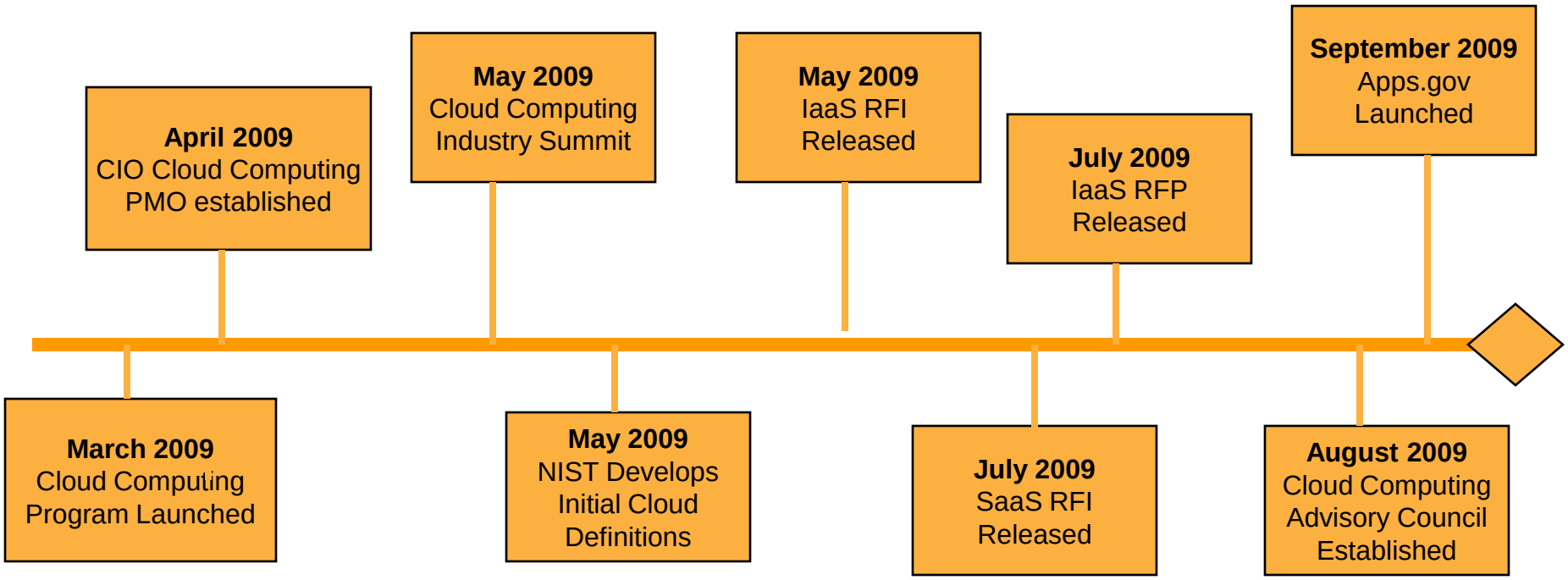


CIO Council Cloud Computing Initiative – Objectives*

- Improve the government's ability to create a transparent, open and participatory government.
- Organize solutions around the constituent groups being served
- Continue the migration towards a services-based environment that is interoperable and standards-based
- Enable rapid deployment of technology solutions for the Federal government without developing stove-pipes
- Enable scalability for existing and new capabilities
- Increase savings through virtualization and economies of scale
- Potentially reduce cost of infrastructure, buildings, power, and staffing.

****Source: Casey Coleman 5/14 IAC Partners Briefing on Cloud Computing***

Cloud Computing Initiative
Key Federal Milestones



- Award of IaaS BPA (low impact) expected by end of Calendar Year
- Private Government Cloud (medium impact) Solicitation expected in 3-6 months
- RFP for SaaS including requirements for FISMA (medium impact) expected in 60-90 days

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Current Federal Cloud Initiatives

- **GSA** issued a Cloud Computing RFI, asking industry to answer specific questions about capability to offer Infrastructure as a Service (IaaS). 38 companies responded.
  - ACT established a Cloud Computing Forum discussion, asking industry for input. http://www.iacsd.org/viewforum.php?f=4
- **DOD** has a cloud computing white paper due out soon
- **DISA** offers Forge.mil and Rapid Access Computing Environment (RACE) as key components of their cloud computing services. RACE providing a rapidly deployable hardware environment and Forge.mil providing the supporting software development environment
- **NASA Ames** is standing up Nebulae, a Cloud Computing environment integrating a set of open-source components into a seamless, self-service platform, http://nebula.nasa.gov/about,
- **DOI** National Business Center is transforming their data center to offer Financial Services in the Cloud, offering test/dev today, production soon
- **GSA** is claiming 80% cost reduction by hosting usa.gov and data.gov in the cloud at Terremark
- **Federal CIO** is promoting 2010 as the “year of pilots”, e-gov money being approved to support

Why Security is a Top Concern

…Cloud Technology changes the security picture

Security is Changed in a Cloud Environment

- The boundaries of your firewall environment may now be different
- Do you have Policies about which applications can share server environments?
- Who has access to your security administration systems?
- Be vigilant in understanding the security capabilities of your Public cloud providers
- Is your data Encrypted through Data-in-Motion and Data-at-Rest technologies.
- Does your Public Cloud Provider accountable for Compliance, Loss, or Misuse issues.

Understanding how to adjust your security procedures and technology are critical to creating a “Secure Cloud” Environment

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Why Data Privacy is a Top Concern

Things you should worry about…

Data Protection and Privacy

- Securing your data that may now be outside your firewall.
- Unauthorized visibility to your data when in a shared computing environment?
- Unintentional cloud administration errors?
  - Providing unauthorized access/rights to others
- Does the Cloud administrator allow other Non secure applications to run on the same servers containing your critical data

Compliance

- The cloud provider's auditing procedures?
- The cloud provider's ability to help you meet your regulatory and compliance requirements?

Understanding Data Privacy Issues is a large determining factor as to whether a Private or Public Cloud option is appropriate

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Questions?